DOCUMENT RESUME

ED 117 954 FL 007 276

AUTHOR Prokop, Manfred
TITLE A Method for True Sequential Processing of Verbal Interaction Analysis Data.
PUB DATE 74
NOTE 11p.
JOURNAL CIT Classroom Interaction Newsletter; n10 p45-49 1974

EDRS PRICE MF-$0.83 HC-$1.67 Plus Postage
DESCRIPTORS Behavior Patterns; *Classroom Observation Techniques; Computational Linguistics; Computer Programs; *Interaction Process Analysis; *Language Instruction; Research Methodology; *Second Language Learning; Student Teacher Relationship; *Verbal Communication
IDENTIFIERS Matrix Analysis; *Sequential Processing

ABSTRACT

This paper describes a method to extract, by computer, maximum amounts of sequential information on pattern frequencies underlying verbal interactions in the foreign language classroom. For this purpose, an observation instrument was developed which was expected to allow the study of the structure of the interaction process; it was hypothesized that such interaction would move with a certain cyclical regularity and that sequential patterns of verbal behavior would be obtained which, in descending order of occurrence, would characterize dominant interactions. A computer program was written which, following certain conditions, segments the total interaction process into strings, lifts out embedded patterns, and orders them into groups of recurrent patterns. Examples are presented to show that sequential processing provides much more meaningful information on a classroom interaction than could hitherto be obtained from matrix analysis. The implications of research in this area for foreign language teaching are briefly discussed. (Author)

**********
* Documents acquired by ERIC include many informal unpublished *
* materials not available from other sources. ERIC makes every effort *
* to obtain the best copy available. Nevertheless, items of marginal *
* reproducibility are often encountered and this affects the quality *
* of the microfiche and hardcopy reproductions ERIC makes available *
* via the ERIC Document Reproduction Service (EDRS). EDRS is not *
* responsible for the quality of the original document. Reproductions *
* supplied by EDRS are the best that can be made from the original. *
**********

PERMISSION TO REPRODUCE THIS COPYRIGHTED MATERIAL HAS BEEN GRANTED BY
Classroom Interaction Newsletter
TO ERIC AND ORGANIZATIONS OPERATING UNDER AGREEMENTS WITH THE NATIONAL INSTITUTE OF EDUCATION. FURTHER REPRODUCTION OUTSIDE THE ERIC SYSTEM REQUIRES PERMISSION OF THE COPYRIGHT OWNER.

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION
THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

ED117954

FL007276

# A METHOD FOR TRUE SEQUENTIAL PROCESSING OF VERBAL INTERACTION ANALYSIS DATA

The systematic analysis of verbal interaction has been in the focus of educational researchers' attention for more than a decade now. According to Karafin (1973), more than 200 observational schemes have been devised to examine many different aspects of interpersonal interactions. The data obtained have, in most cases, been presented in the form of a matrix which allows reading of frequencies of pairs of verbal behaviors, of sustained interactions, of areas of influence, and from which various ratios may be calculated which quantitatively describe some more general dimensions of the interaction patterns.

Although the sequence of recording data is considered to be important (Karafin, 1973), only a few studies have successfully preserved proximity relations among more than two neighboring verbal behaviors. Bellack and Davitz (1968) have described several dimension of verbal moves in a sequential data analysis and have obtained enormous amounts of useful information. Simon and Agazarian's (1967) sequential analysis of verbal interaction dealt with matrix patterns; and Agazarian's (1969) analysis of verbal behavior and information transfer in patterns of communication also did not preserve the sequentiality of data. Urbach (1968) established sequence classes and sub-divisions using Flanders' codes in an "interaction sequence graph", but did not extract recurring patterns as such. Seidmann (1970) attempted to uncover interaction patterns which portray the kinds of verbal exchange between teacher and student; her patterns always begin with a question by the teacher,

followed by a student response, and always end with the teacher's reaction to the student's answer. Nuthall's (1972) analysis showed that - following Bellack - verbal interaction can be reduced to sequences of moves.

However, pragmatic assistance to the practitioner and the researcher have been limited to supplying computer programs to pre- and analyze matrices for interaction analysis (For example, na, 1973). This paper describes a method to extract, by computer, maximum amounts of sequential information on pattern frequencies underlying entire transactions.

For this purpose, an observation instrument was developed which was expected to allow the study of the structure of the interaction process in foreign language teaching/learning. It was hypothesized that such interaction would move with a certain cyclical regulaity and that sequential patterns of verbal behavior would be obtained, which - in descending order of frequency of occurrence - would characterize dominant interactions. It was hoped that these patterns could be the basis for conceptual and experimental research in FL teaching methodology, specifically in terms of the efficiency and effectiveness of given types of verbal interaction patterns. As the entire study is described elsewhere (Prokop, 1974), this paper will only describe the process of arriving at the strings of verbal behavior, their segmentation, and ordering into patterns.

The FL interaction was conceptualized along the lines of the language game model (Hyman, 1968; Bellack & Davitz, 1968; Smith & Meux, 1968), in which verbal interactions follow certain rules.

One of the participants in the interaction initiates a move to which one of the other players is normally expected to respond; this response may be further clarified by the same or another participant; subsequently, the response may be positively or negatively evaluated (or not at all); additional response clarification and evaluation may follow the first response module:

Initiator// $R_1$ - $R_2$ .../ $Ev_1$// $R_1$ - $R_2$ .../$Ev_2$// .... [1]

A new cycle would be started with the next initiating move.

The observation instrument (See Appendix) is based on Flanders' codes, but was redesigned and fitted out with supplementary prefixes and suffixes; numerical codes referred to general activities, while prefixes and suffixes represented content or activities found in FL interactions. All codes were uniquely defined as being initiatory, responsive, or evaluative.

Taping the classes and coding operations were performed with the usual precautions; codes were entered by type of move observed, not in fixed time intervals. As the investigator was interested in the exact sequence of an entire behavior pattern, the usual procedure of entering pairs of subsequent codes alternately in rows and columns of a matrix (Flanders, 1966, p. 23) was not followed, as it has been shown that in such a matrix information is only available with regard to contiguous codes, but not to the entire string (Prokop, 1969). For this reason, a computer program

---

[1] The complete report (Prokop, 1974) shows that there were never more than two response modules, which -in turn- never contained more than two responses and an evaluation code.

was written, which fulfilled the following conditions:

(1) It considered the string from first initiator up to, but excluding, the second initiator to be the first pattern, from the second initiator to, but excluding, the third initiator the second pattern, etc. For example,

4C-8C-1-3R-7R-4C-8C-5C-4C-8C-1

was divided into three patterns

4C-8C-1 (2)
3R-7R
4C-8C-5C

The overwhelming majority of patterns could be tabulated in such a way.

(2) When a response (except a repetition) occurred without an initiator preceding it, it was tentatively assigned to the last initiator encountered; in such a case, the initiator was held to be responsible for a sequence of responses. Thus

3R-7R-1-7R-2P-7E-7R-1

was divided into

3R-7R-1 (2)
7R-2P-7E

(3) When a pattern was embedded in another one (and therefore interrupted it), the embedded pattern was lifted out, and a subsequent response was assigned to the last initiator encountered, e.g.

3R-7R-1-7R-2P-7E-4C-8C-1-7R-2P-7E-1

was represented as

3R-7R-1
-7R-2P-7E
-7R-2P-7E-1
4C-8C-1

These three rules were sufficient to segment unequivocally about 95% of any string obtained. The residual verbal behaviors had to be classified by visual inspection; following consultation of the tape recording, each was printed out with those three patterns which immediately preceded or followed them. The most frequent cases of that kind were:

(a) more than one initiator side by side. e.g.

3R-6R-7R (instructor directs student(s) to read; reads himself; student reads after him)

6C-4C-8C (instructor presents information about content, asks a content question; and receives an unpredictable student response)

6C-9C-5C (instructor presents information about content, student initiates information about content, instructor responds)

9S-3T-8T (student initiates information about structure, instructor asks students to translate; and receives a translation as response).

In these cases, the tape recording was consulted again, and it was decided on that basis whether there was a mix-up in the interaction (e.g. non-responsive verbal behavior) or whether the first and second initiators belonged together within the context of the interaction. In the former case, a pattern such as 9S/***/***/[2] was established, in the latter a 6C-4C/8C**/***/

(b) initiator followed by evaluator, e.g. 9C-1, 6S-1; with the help of the tape, patterns were established, 9C/***/***/ and */**1/***/, when the praise was not specifically directed at

---

[2]An asterisk * indicates an empty slot in the interaction module.

the student's initiating information, but when it was a global statement.

(c) two evaluators side by side, e.g. 4S-8S-2S-1; 3M-7M-1-2M. Patterns were created in which one of the two evaluators was used to refer to the interaction in question, the other being a more generalized statement of evaluation. Thus, depending on which of the two evaluators was the global evaluation, for example

4S/8S*2S/***/
*/**1/***/

(d) instructor response and evaluation side by side, e.g.

9T-5T-1 was represented as

9T/5T**/***/
*/**1/***/

(e) instructor initiation and response were side by side, e.g. 4C-5C or 6R-5C. Both types were accepted as genuine patterns 4C/5C**/***/ and 6R/5C**/***/, respectively, the first one as an answer to a question which was not answered by the students; the latter was construed to refer to explanation of content in a reading activity.

The following is an actual sample string:

G3R-G7R-G2P-G7E-G7R-G2P-G7E-G7R-G2P-G7E-G7R-G2P-G7E-G7R-G1-
-G7R-G2P-G7E-G7R-G2P-G7E-G7R-G1-G4C-G8C-G4C-G8C-G1-G4C-G8C-
-G1-E9C-G5C-G6C-G4C-G5C-G4C-G8C-G6R-G4T-E8T-G1-G4C-G8C-G3R-
-G7R-G2P-G7E-G7R-G1-G4T-E8T-E2T-G4C-G8C-G1

This string was analyzed as

(G3R)//G7R*G2P//G7E**// (7)
(G3R)//G7R*G1// (3)
G4C //G8C**// (3)
G4C //G8C*G1// (3)

| | |
|---|---|
| G6R //***// | (1) |
| G4T //E8T*G1// | (1) |
| G4T //E8T*E2T// | (1) |
| G6C //***// | (1) |
| G4C //G5C**// | (1) |
| E9C //G5C**// | (1) |

The dominant interactions in this sample were, therefore, of two basic kinds: the instructor directed students to read, which they did; their response was either praised or their pronunciation was corrected; they repeated the response and received praise for their correction. The other basic type involved the instructor's asking content questions, the answers to which were either not evaluated at all or evaluated by praise. Of course, no judgment could be made on whether the seemingly erratic behavior in the six remaining patterns was detrimental or perhaps beneficial to effective and efficient learning.

Table 1 presents some of the data obtained in this study which are relevant to the present purpose. It can be seen that the average pattern was short, involving between 2.5 and 3.3 verbal behaviors; interactions in Beginners classes were much more quick-change oriented than those in Intermediate classes. For each instructor the average pattern occurred between 5 and 11 times over all class sessions. The number of different patterns was high, ranging between 137 and 192 in frequency. When patterns were cumulated across all classes, 413 different patterns of verbal interaction were obtained.

These numbers show the enormous range of different types of interaction between instructor and student in the process of teaching/learning a foreign language. To be sure, some patterns ocurred only very few times while others accounted for major portions of

Table 1.-- Frequencies of verbal behaviors and patterns

| Frequencies | Beginners' German Instructor | | Intermediate German Instructor | |
|---|---|---|---|---|
| | B1 | B2 | I1 | I2 |
| Number of class periods observed | 6 | 6 | 10 | 9 |
| Number of verbal behaviors recorded | 2,695 | 3,767 | 3,553 | 3,304 |
| Number of patterns | 1,023 | 1,519 | 1,185 | 996 |
| Mean number of patterns per period | 170 | 253 | 119 | 110 |
| Mean number of verbal behaviors per pattern | 2.6 | 2.5 | 3.0 | 3.3 |
| Number of different patterns | 142 | 137 | 162 | 192 |
| Mean number of pattern occurrence | 7.20 | 11.09 | 7.31 | 5.19 |

the interaction; this implies that there appeared to be verbal behaviors for routine purposes and others for special purposes. It will be the subject of further research to isolate these types and to determine their role in effective and efficient communication for foreign language learning. In any case, it is clear that much more information (which more accurately reflects realities) can be obtained from sequential information processing than from the conventional matrix analysis.

Appendix: Verbal behavior categories and their primary and supplementary suffixes

| | Intonation | Pronunciation | Structure | Meaning | Spelling | (Cultural) Content | Translation of word, phrase or sentence | Reading a dialog, text or excercises | Writing | Prepared oral presentation | Unprepared oral presentation | Repetition and imitation | General procedure | Supplementary suffix: response alternation | Supplementary suffix: choral response |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Positive feedback | | | | | | | | | | | | | 1 | | |
| Negative feedback | 2I | 2P | 2S | 2M | 2L | 2C | 2T | | | | | | 2 | | |
| Directions | 3I | 3P | 3S | 3M | 3L | 3C | 3T | 3R | 3W | 3Q | 3U | 3E | 3 | | |
| Questions | 4I | 4P | 4S | 4M | 4L | 4C | 4T | | | | | | 4 | | |
| Instructor response | 5I | 5P | 5S | 5M | 5L | 5C | 5T | | | | | 5E | 5 | | |
| Initiation of information by instructor | 6I | 6P | 6S | 6M | 6L | 6C | 6T | 6R | | | 6U | | 6 | | |
| Predictable student response | 7I | 7P | 7S | 7M | 7L | 7C | | 7R | | 7Q | 7U | 7E | 7 | A | Z |
| Unpredictable student response | 8I | 8P | 8S | 8M | 8L | 8C | 8T | | | | 8U | | 8 | A | |
| Initiation of information by students | 9I | 9P | 9S | 9M | 9L | 9C | 9T | | | | | 9E | 9 | | |

## REFERENCES


Agazarian, Yvonne, A Theory of Verbal Behavior and Information Transfer. Classroom Interaction Newsletter, 1969, 4(2), 22-33.

Bellack, Arno A., and Joel R. Davitz, in collaboration with Herbert M. Kliebard, Ronald T. Hyman, and Frank L. Smith Jr., The Language of the Classroom. In Ronald T. Hyman (Ed.) Teaching: Vantage Points for Study. Philadelphia: J. B. Lippincott, 1968, pp. 84-97.

Flanders, Ned A. Interaction Analysis in the Classroom (A Manual for Observers). Ann Arbor, Mich.: School of Education, University of Michigan, 1966.

Hyman, Ronald T., The Flow of Teaching. In Ronald T. Hyman (Ed.) Teaching: Vantage Points for Study. Philadelphia: J. B. Lippincott, 1968, pp. 98-100.

Karafin, Gail R., Discussion of Considerations for Selecting or Developing an Observational System. CIN, 1973, 8(2), 15-32.

Nuthall, Graham, The University of Canterbury Teaching Research Project. CIN, 1972, 7(2), 3-13.

Pena, Deagelia M., A Computer Program to Produce Matrices for Interaction Analysis. CIN, 1973, 8(2), 3-14.

Prokop, Manfred, Sequential Analysis of Verbal Behavior Patterns in a Flanders Interaction Analysis Matrix. CIN, 1969, 4(2), 53-59.

Prokop, Manfred, Verbal Behavior in Foreign Language Instruction. MLA/ERIC Documentation Center, 1974.

Seidman, S., The Flow Chart Method of Categorizing Teaching Behavior. CIN, 1970, 6(1), 24-33.

Simon, Anita, and Yvonne Agazarian, Sequential Analysis of Verbal Interaction. Philadelphia: Research for Better Schools, 1967.

Smith, B. Othanel, and Milton Meux, A Study of the Logic of Teaching. In Ronald T. Hyman (Ed.) Teaching: Vantage Points for Study. Philadelphia: J. B. Lippincott, 1968, pp. 101-117.

Urbach, Floyd, The Interaction Sequence Graph: Analyzing for Patterns of Teaching Behavior. CIN, 1968, 4(1), 14-26.